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RESEARCH ARTICLE

Malpractice Claim Fears and the Costs of Treating Medicare Patients: A New Approach to Estimating the Costs of Defensive Medicine

James D. Reschovsky and Cynthia B. Saiontz-Martinez

Objective. To estimate the cost of defensive medicine among elderly Medicare patients.

Data Sources. We use a 2008 national physician survey linked to respondents' elderly Medicare patients' claims data.

Study Design. Using a sample of survey respondent/beneficiary dyads stratified by physician specialty, we estimated cross-sectional regressions of annual costs on patient covariates and a medical malpractice fear index formed from five validated physician survey questions. Defensive medicine costs were calculated as the difference between observed patient costs and those under hypothetical alternative levels of malpractice concern, and then aggregated to estimate average defensive medicine costs per beneficiary.

Data Collection Methods. The physician survey was conducted by mail. Patient claims were linked to survey respondents and reweighted to approximate the elderly Medicare beneficiary population.

Principal Findings. Higher levels of the malpractice fear index were associated with higher patient spending. Based on the measured associations, we estimated that defensive medicine accounted for 8 to 20 percent of total costs under alternative scenarios. The highest estimate is associated with a counterfactual of no malpractice concerns, which is unlikely to be socially optimal as some extrinsic incentives to avoid medical errors are desirable. Among specialty groups, primary care physicians contributed the most to defensive medicine spending. Higher costs resulted mostly from more hospital admissions and greater postacute care.

Conclusions. Although results are based on measured associations between malpractice fears and spending, and may not reflect the true causal effects, they suggest defensive medicine likely contributes substantial additional costs to Medicare.

Key Words. Defensive medicine, medical malpractice liability, Medicare, health care costs

Medical malpractice liability has long been a controversial issue that often takes on partisan tones. The debate largely centers over whether it is too easy or too hard to sue over medical errors. Those saying that it is too easy and rewarding to sue claim that suits are often frivolous and advocate for malpractice tort reforms such as caps on noneconomic jury awards. Others oppose these reforms, pointing to the benefits of the malpractice tort system in incentivizing physicians to avoid medical errors and making victims of such errors whole. They also note that most victims of medical errors never file suit or receive any compensation (Localio et al. 1991; Mello et al. 2010).

A central facet of this debate has centered on the costs of the malpractice tort system. The costs of adjudicating malpractice claims and payouts are substantial, along with the premiums from insuring against these costs. Yet these direct costs of the medical malpractice tort system likely pale in comparison with the indirect costs from defensive medicine (Localio et al. 1991; Mello et al. 2010). Defensive medicine encompasses actions providers take to reduce their risk of malpractice claims. Although physicians may engage in defensive medicine through "avoidance behaviors"—that is, minimizing the types of patients, procedures, or geographic areas associated with greater malpractice liability risk—the most significant type of defensive medicine stems from physician actions to reduce their exposure to malpractice liability claims through costly "assurance behaviors," the greater provision of services or more frequent referrals of patients to other physicians or hospitals (Klingman et al. 1996).

Ultimately, defensive medicine stems from physicians' fear of malpractice suits, which can impose reputational and psychological costs on them beyond any direct pecuniary costs. A recent study of first-contact physicians treating Medicare patients with nonspecific but common complaints found that physicians' fears about malpractice claims were associated with more diagnostic testing, but the stringency of state malpractice tort laws was not associated with this or other assurance behaviors (Carrier et al. 2013). This is likely because physician malpractice fears, as captured by surveys, are only very weakly associated with state-based objective measures of malpractice risk or features of state malpractice tort laws (Carrier et al. 2010). This disconnect between actual malpractice risks or tort laws and malpractice fears has been attributed to "dread fear," the tendency of people to overestimate the risk of

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Address correspondence to James D. Reschovsky, Ph.D., Mathematica Policy Research, 1100 First St. NE, 12th Floor, Washington, DC 20002; e-mail: jreschovsky@mathematica-mpr.com. Cynthia B. Saiontz-Martinez, Sc.M., is with the Social and Scientific Systems, Inc, Silver Spring, MD.

rare events (in this case malpractice claims) and to be particularly fearful of risks that are unfamiliar, potentially catastrophic, or difficult to control (Carrier et al. 2010). This suggests malpractice tort law reforms are likely ineffective in reducing physician malpractice fears, and consequently the costs of defensive medicine. Rather policy makers might more productively focus on alternatives to the current tort system to reduce physician malpractice fears.

In this study, we develop and apply a new approach to estimating the cost of defensive medicine, one derived from the relationship between physician malpractice fears and patient costs. While not perfect, we argue our approach is superior to methods used for earlier estimates. Moreover, we produce estimates in light of explicit counterfactuals—differences in costs relative to an alternative state or scenario—something missing from most previous attempts to measure defensive medicine costs (Hermer and Brody 2010). Counterfactuals are important because if we replace the current medical malpractice liability system, some external incentives for physicians to avoid medical errors would presumably remain, and as such, some different, presumably more suitable, level of physician fear and defensive medicine would remain. We also identify which physician specialties are most responsible for defensive medicine costs and which types of services are most affected.

Past Efforts to Estimate Defensive Medicine Costs

The cost of defensive medicine has proven notoriously difficult to estimate. Accordingly, cost estimates vary wildly, stoking the medical malpractice liability debate (Wright and Baicker 2012). Previous defensive medicine cost estimates mostly focused on small sets of conditions or physician specialties selected on the expectation of finding defensive medicine (Kessler and McClellan 1996; Klingman et al. 1996). As such, these studies cannot inform the costs of defensive medicine over broad patient populations.

Generally, two main approaches have been used. The first directly surveys physicians to ask them about whether and how extensively they practice defensive medicine. These studies generate the highest estimates of defensive medicine costs, with between 21 and 98 percent of physicians admitting to defensive medicine practices (Studdert et al. 2005; Thomas, Ziller, and Thayer 2010; Sethi et al. 2012). But these studies suffer from likely survey response bias because those most concerned about medical malpractice liability are most likely to respond to such surveys. Survey question responses may

also be biased because of the near-universal physician disdain for medical malpractice suits. These biases may be intensified because such surveys tend to be conducted during periodic "malpractice liability crises" when medical malpractice premiums spike (normally because of malpractice insurance underwriting cycles rather than an uptick in malpractice claims; Lawthers et al. 1992). Moreover, a recent experimental study found that physician responses to these types of survey questions are very sensitive to how the questions were framed (Baicker, Wright, and Olson 2015). The other major problem with survey-based defensive medicine cost estimates is that no appropriate methods to extrapolate survey responses into aggregate estimates of defensive medicine costs exist.

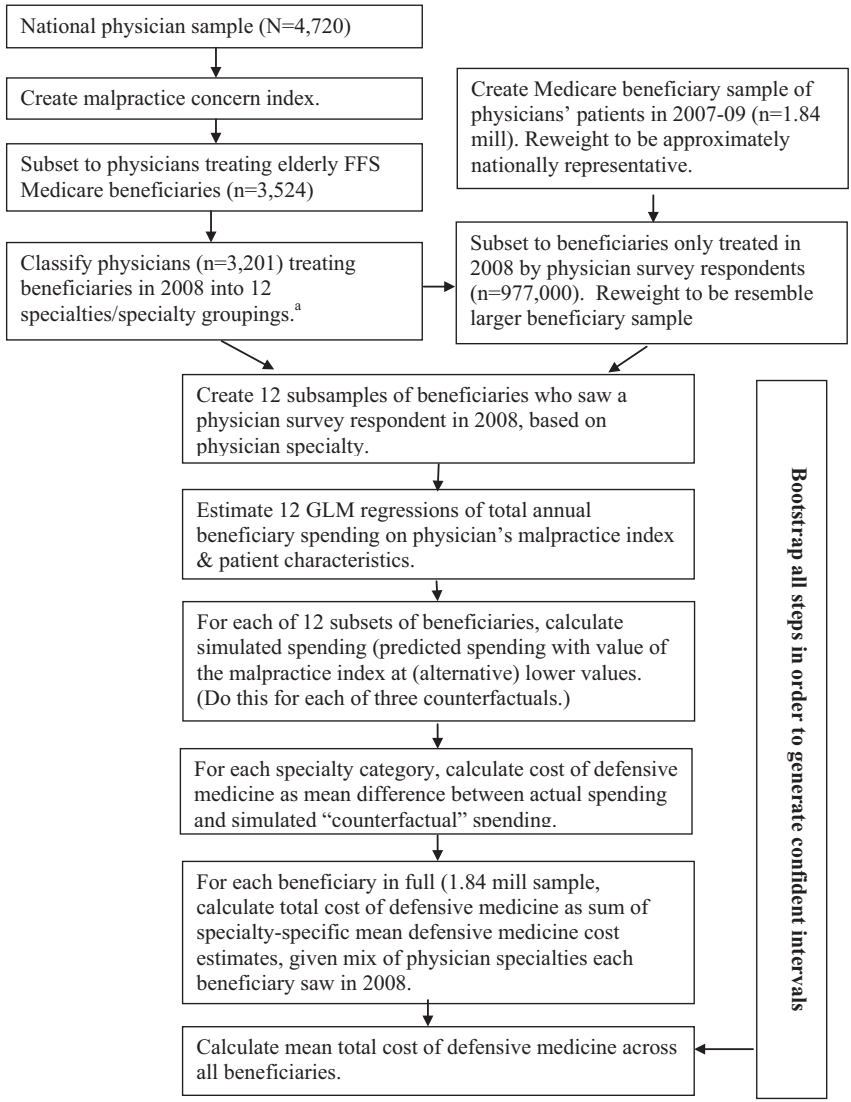
A second set of studies uses statistical approaches to relate medical costs —often from claims data—to malpractice liability "risk signals." These signals include state tort laws, malpractice insurance premiums, or rates of malpractice claims and awards. Most of these studies have found that defensive medicine costs are low, contributing no more than a few percent to total medical spending (Thomas, Ziller, and Thayer 2010). However, these studies fail to capture the root cause of defensive medicine because the risk signals are only very weakly associated with physician malpractice fears (Carrier et al. 2010). They subsequently understate the costs of defensive medicine. This conclusion is substantiated by other findings that defensive medicine practices (obtained from surveys) and Medicare beneficiary costs are unrelated to individual malpractice liability tort law measures (Localio et al. 1991; Glassman et al. 1996; Sloan and Shadle 2009).

We used the same linked physician survey and claims data as Carrier et al. (2013) to associate physicians' survey-based malpractice fears with their Medicare patients' medical spending. We then use these estimates to generate what we characterize as estimates of the costs of defensive medicine among elderly Medicare beneficiaries. Use of a subjective index of malpractice liability fears to estimate the cost of defensive medicine is justified because physicians tend to overstate the malpractice liability risks they face, but it is perceived risk that influences clinical decisions (Lawthers et al. 1992).

Data

Figure 1 provides an overview of the sample construction and analytic methods. We used claims from a national sample of elderly fee-for-service beneficiaries without end-stage renal disease enrolled in Medicare (Parts A and B)

Figure 1: Data and Analysis Schematic



Note. [a]A random subset of specialist physicians were linked to Medicare claims for budgetary reasons. Because of this, new physician weights were constructed. Beneficiary weights incorporate these new weights.

who received at least one service between 2007 and 2009 from respondents to the 2008 Center for Studying Health System Change Health Tracking (HSC-HT) Physician Survey (n = 4,720; response rate = 62 percent). This nationally representative mail survey used the AMA Masterfile as its sampling frame and excluded federal employees, physicians in training, those spending less than 20 hours per week in direct patient care, and specialists with traditionally limited direct patient contact (e.g., radiologists, anesthesiologists, and pathologists). Descriptions of survey methodology and content are available elsewhere (Strouse et al. 2009; Carrier et al. 2010). The beneficiary sample of nearly 2 million was formed by identifying those receiving any Medicare services over the three year period from 3,524 physician survey respondents with a valid National Provider Identifier (NPI) who treated elderly Medicare patients. We use 2008 claims, the year of the survey. Because patients seeing a greater number of unique physicians are likely in poorer health and are more likely to be included in the beneficiary sample, weights were developed to make the beneficiary sample approximately nationally representative. Detailed information about data sources and methods is available in the online Appendix SA2.

METHODS

The physician survey contained five previously validated questions on physicians' fears of malpractice liability claims and propensity to engage in defensive medicine, shown in Table 1 (Fiscella et al. 2000; Katz et al. 2005; Reed et al. 2008). Each used a five-level Likert scale to indicate agreement with a statement, from "strongly agree" to "strongly disagree." Responses across questions were highly concordant, and we calculated physicians' overall level of malpractice liability concern by averaging the five scores (each coded one through five).

Unlike previous research which is often framed in terms of the cost savings from moving from one particular tort law regime to another, we estimate cost savings associated with a change in malpractice fears among physicians. Our basic approach was to compare differences in beneficiary costs (total allowed charges) between those treated by otherwise similar physicians with high versus low (or no) malpractice liability fears.[1] The difference between observed beneficiary costs and that predicted if physicians expressed no malpractice liability concerns or some lower level of concern serves as a building block for our estimates of defensive medicine costs.

Table 1: HSC Health Tracking Physician Survey Malpractice Questions

Considering the Full Range of Patients That You See, Indicate Your Level of Agreement with the Following Statements about Medical Malpractice

1. I am concerned that I will be involved in a malpractice case sometime in the next 10 years.
2. I feel pressured in my day-to-day practice by the threat of malpractice litigation.
3. I order some tests or consultations simply to avoid the appearance of malpractice.
4. Sometimes I ask for consultant opinions primarily to reduce my risk of being sued.
5. Relying on clinical judgment rather than on technology to make a diagnosis is becoming riskier because of the threat of malpractice suits.

(Response categories were strongly disagree, disagree, not sure, agree, and strongly agree.)

Source: 2008 HSC Health Tracking Physician Survey.

Our approach highlights an important normative question not addressed in prior research: What is the appropriate counterfactual to use? In other words, should defensive medicine costs be defined as the difference between current costs and hypothetical costs of physicians with no medical malpractice liability fears (and implicitly no external repercussions from making medical errors)? As a goal of the medical malpractice liability tort system is to incentivize providers to avoid medical errors, it seems appropriate to measure defensive medicine costs relative to some socially optimal external incentive to avoid medical errors (Baicker, Fisher, and Chandra 2007; Mello et al. 2010). This implies some defensive medicine is desirable to reduce medical errors and enhance health care quality. While we do not know how this optimal level might translate to our malpractice fear index, we provide estimates based on three alternative scenarios or counterfactuals:

1. All physicians have no malpractice liability concerns (malpractice index = 1).
2. Physicians are at most "somewhat" concerned about malpractice liability claims (maximum malpractice index = 2).
3. Recognizing that different specialties face different risks of malpractice claims, physicians have at most malpractice liability concerns associated with the 20th percentile of their specialty group.

Only 2.6 percent of physicians expressed no malpractice fears, and 8.4 percent had malpractice index values of 2 or less.

Ideally, we would observe malpractice liability fears of each physician that beneficiaries receive services from. However, our data provide malpractice fear index values for one physician seen by each patient, the physician

survey respondent. Consequently, we had to generalize from physician respondent/patient dyads for which malpractice fears are observed.

Because physician specialties experience differing malpractice liability risks, malpractice fears, and opportunities to engage in defensive medicine, we divided survey respondents into 12 specialty categories. We combined primary care specialists into one category and, with the assistance of a physician consultant, combined specialties with fewer than 75 survey respondents into three broader categories of other cognitive, procedural, and surgical specialists (mappings are shown in Appendix SA2).[2] We then estimated 12 general linear models (GLMs) to regress patient total annual costs on the physician's malpractice fear index score, controlling for beneficiary characteristics (dummy variables indicating 14 age/sex categories, initial Medicare eligibility due to disability, race [black, white, other], and beneficiary death, as well as the number of months alive during 2008.) We experimented with including an overall health indicator, the hierarchical condition category score of the beneficiary, but its inclusion had little impact on the malpractice concern index coefficients. These models used a log link and gamma distribution, a specification previously found well suited to skewed health expenditure data (Buntin and Zaslavsky 2004).[3] The GLMs were estimated on 12 subsamples of the 977,000 beneficiaries who saw a survey respondent in 2008.[4] Full model results are available from the authors.

Predicted values were converted into natural dollar units. The specialty-specific contribution to defensive medicine costs was obtained by calculating the difference between the patient's actual costs and the simulated amount under each counterfactual. We then calculated patient-specific total costs of defensive medicine (separately for each of the three counterfactuals) by calculating the sum of the specialty-specific mean estimates for those physician specialties the patient saw during the year. For instance, if a patient saw at least one primary care, cardiology, and dermatology physician during the year, the three associated mean marginal effects (specialty-specific estimates of defensive medicine costs) would be summed to generate the total estimate of the cost of defensive medicine for that patient. This entire multistep process (including GLM equations and aggregation) was bootstrapped to generate confidence intervals.

Because we observe the malpractice fears of just one physician treating each beneficiary, the specialty-specific cost models were estimated on 12 distinct patient samples. This forced us to assume that the 12 cost equations were independent of one another and that the estimated effects were additive; in other words, we assumed the propensity of one physician to engage in

defensive medicine is unaffected by the propensity of physicians in other specialties treating the same patient to engage in defensive measures. However, malpractice fears among physicians treating given patients could be correlated because of preferential referral to colleagues with similar risk beliefs, network propagation of risk beliefs, local area or organizational variations, or unmeasured patient characteristics affecting their selection of providers with common risk beliefs and practice patterns. These examples imply positive malpractice index correlations among physicians treating a patient, which would in essence result in double counting of a portion of estimated defensive medicine costs, that is, a positive bias. But such correlations could be negative as well. For instance, greater malpractice fears may prompt physicians to refer more patients to specialists. As a result, specialists may experience less acute patient panels, resulting in lower malpractice fears. Hence, the direction of any bias is uncertain.

To assess the likelihood that correlations in physician malpractice fears could affect our estimates, we examined intracounty correlations of physician malpractice fears using the HSC-HT physician survey. We subset to physicians in counties with at least two survey respondents (n = 4,213) and estimated a hierarchical random-effects model of our malpractice index, from which we calculated the intraclass correlation (ICC).

Although we characterize our estimates as defensive medicine costs, we should caution that the study is correlational in nature, and causal inferences between physician malpractice fears and patient costs are inappropriate. More precisely, we are estimating changes in patient costs if physicians practiced in present patterns, but averaged over a counterfactual distribution of malpractice fear reports. Like any correlational study, the possibility of bias from confounding exists.

Results

Beneficiary sample characteristics were similar to those obtained from administrative data on a similar but not identical beneficiary population (see Appendix SA2). Our sample skewed toward older beneficiaries somewhat.

The distribution of our malpractice concern index among HSC-HT physician survey respondents linked with claims data indicates the index, which ranges from 1 to 5, was skewed toward expressions of greater concern

(mean = 3.71, SD = 1.00; median = 4.0). The 10th/90th percentile range was 2.4–5.0, while the interquartile range was 3.0–4.4.

Our test of whether physician malpractice fears are correlated with one another within counties indicated they were not. The ICC calculated using the hierarchical random-effects model without model covariates was found to be extremely small (0.0006), and half this size when covariates were added to the model. Although this suggests physician malpractice index values are uncorrelated, we caution that malpractice fears may be more correlated if we were able to identify physicians within specific referral networks or health systems. Covariates in the second hierarchical model included a broad array of physician and practice characteristics. Apart from physician specialty, coefficients on these were either insignificantly or very weakly associated with malpractice fears (see Appendix SA2 for details). This allays concerns that results from our patient expenditure models might be subject to confounding.

Table 2 shows results from the 12 specialty-specific models from which defensive medicine cost estimates were derived. To help interpret these results, we illustratively compare primary care and emergency medicine physicians. Regression model coefficients indicating the marginal effect of the malpractice index on the log of beneficiary costs were the largest for patients seen by primary care physicians. This represents both the cost of services provided by the primary care physicians (PCPs) and marginal costs associated with the proclivity to refer patients to specialists and emergency departments, as well as to hospitalize patients. On average, annual medical costs were about 4 percent (coefficient = 3.97) higher for each unit increase on PCPs' malpractice index. The corresponding coefficient for patients who saw an emergency medicine physician was lower (2.31). However, emergency medicine physicians are on average more concerned about malpractice liability than primary care physicians (index values: 4.1 vs. 3.7)—such that their specialty-specific contributions to defensive medicine costs, a function of model coefficients, and the "distance" between the average malpractice liability fears in the specialty group and the counterfactual value—are larger. Moreover, emergency physicians tend to see sicker and more costly patients on average than PCPs. The aggregate effect of these factors is illustrated in the last column of the table where the average contribution to defensive medicine costs per beneficiary/specialty dyad is shown using the second counterfactual (physicians have a maximum malpractice index score of 2). The average contribution to defensive medicine costs per beneficiary seen by emergency medicine physicians is $1,050, compared with $632 for PCPs. However, as 21 percent of

Table 2: Physician Specialty Groups, Their Mean Malpractice Score, Number of Beneficiaries Seen, and Marginal Effect on Medicare Costs

Specialty/Specialty Group[†]	*Number of Physicians*	*Number of Beneficiaries Seen by Physician Survey Respondents in 2008*	*Mean Physician Malpractice Concern Score (1 = Lowest; 5 = Highest)*	*Percentage Effect on Beneficiary Costs from One-Point Increase in Malpractice Index*	*Mean Per-Beneficiary Defensive Medicine Cost Relative to Counterfactual #2*[‡]
Primary care	1,432	343,609	3.67	3.97***	$632
Cardiology	125	117,432	3.63	0.90*	255
Emergency medicine	158	52,176	4.10	2.31*	1,050
General surgery	135	26,394	4.04	1.12	371
Obstetrics/ Gynecology	203	16,101	3.87	−3.65**	−421
Ophthalmology	122	92,354	3.78	0.70	76
Orthopedic surgery	129	37,541	4.00	−2.84***	−744
Dermatology	79	65,546	3.53	2.94***	303
Psychiatry	134	7,483	3.19	2.47	608
Other cognitive specialties	332	98,138	3.58	1.00*	320
Other procedural specialties	88	31,221	3.33	−1.00	−192
Other surgical specialties	264	79,814	3.87	3.66***	775

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.
[†]See Appendix SA2 for specific specialties included in grouped categories.
[‡]Physicians are at most "somewhat" concerned about malpractice liability claims (maximum malpractice index = 2).
Source: 2008 linked HSC Health Tracking Physician Survey/Medicare claims data.

beneficiary/physician specialty dyads were with PCPs as compared with 6 percent for emergency medicine physicians, primary care physicians account for about twice as much defensive medicine costs than emergency medicine physicians in the aggregate.

Of note, three specialty group regressions produced negative coefficients on the malpractice index—suggesting that defensive medicine practices lowered costs. This is plausible as some research suggests that defensive medicine can improve care quality and because avoidance behaviors may result in lower service use (Klingman et al. 1996; Frakes and Jena 2014). However, negative coefficients could also reflect data or statistical anomalies. One of the three specialties is obstetrics/gynecology. To the extent these physicians

provide both obstetric and gynecological care fears about malpractice claims most likely to stem from obstetric cases, which are not relevant to elderly Medicare beneficiaries. This could potentially skew the relationship between overall malpractice concerns and the costs of treating their Medicare patients. The second specialty group, other procedural specialists, had only a small and statistically insignificant negative coefficient, which could reflect that this group is an amalgam of specialties, each with differing malpractice fears and opportunities to engage in defensive medicine. Finally, the negative coefficient found for orthopedic surgeons might reflect the discretionary nature of many orthopedic procedures and is consistent with negative associations between malpractice liability payments and major procedures found by others (Baicker, Fisher, and Chandra 2007).

Per-Beneficiary and Aggregate Costs of Defensive Medicine

Table 3 presents aggregate per-beneficiary defensive medicine costs for our three counterfactuals. Eliminating all physician malpractice fears (our first counterfactual) is associated with a decrease in Medicare costs by over 20 percent, or $2,192 per beneficiary (in 2015 dollars). This totals about 83 billion inflated dollars if applied to the full population of elderly fee-for-service and Medicare Advantage beneficiaries in 2008. The more reasonable counterfactual that physicians were no more than somewhat concerned about medical malpractice was associated with a 14 percent cost decrease ($1,481 per beneficiary; $56 billion total). Finally, the relative counterfactual, where every physician's malpractice score is set no greater than the 20th percentile of their specialty group, produced the lowest estimate, an 8 percent decrease ($858 per beneficiary, $32 billion total).

Which Specialties Contributed the Most to Defensive Medicine Costs?

In Table 4, we show how each specialty category contributed to defensive medicine cost estimates under the second counterfactual. (Results were similar for the other counterfactuals.) Primary care physicians, other surgical specialists (excluding general and orthopedic surgeons), and emergency medicine physicians contributed the most to total defensive medicine costs, 40, 29, and 20 percent, respectively.

Table 3: Estimates of the Costs of Defensive Medicine among the Elderly Medicare Population under Three Counterfactuals (in 2015 dollars)

Assumed Optimal Level of Malpractice Concern (Counterfactual)	*Mean Defensive Medicine Cost per Beneficiary (95% CI)*	*Percentage of Total Per-Beneficiary Costs* (95% CI)*	*Aggregate Defensive Medicine Costs† ($billions)*
All "not concerned"	$2,192 (1,639–2,769)	20.5 (15.3–25.9)	$82.7
All not more than "slightly concerned"	$1,481 (1,138–1,848)	13.8 (10.6–17.3)	$55.9
All no more than at 20th percentile for specialty group	$858 (645–1,057)	8.0 (6.0–9.9)	$32.3

*Per-beneficiary and population dollar amounts inflated to 2015 dollars using the CPI-U index. Mean inflated beneficiary total costs equaled $10,709.
†Population cost estimates are based on a population of 37,708,097 million aged beneficiaries without end-stage renal disease in 2008 as reported in the Medicare and Medicaid Statistical Supplement, 2009 (Table 2.3). This includes both the fee-for-service and Medicare Advantage beneficiaries, whereas defensive medicine estimates are made only using fee-for-service beneficiaries. The corresponding number has grown to nearly 42 million in 2013, the most recent data available.
CI, confidence interval.
Source: Linked 2008 HSC Health Tracking Physician Survey and Medicare claims dataset.

What Types of Services are Used More for Defensive Medicine?

We replicated our methods, stratifying costs into nine service categories. Because many patients do not use each type of service each year, we tested ordinary least-squares and two-part models. Results were somewhat sensitive to model specification, however (see Appendix SA2 for results). This is perhaps not surprising as we divided the sample into 108 subgroups and estimated separate models for each. But we consistently found a large majority of defensive medicine costs (over 70 percent) were associated with greater hospital and postacute care, consistent with a survey-based analysis by the state of Oregon (Wright and Baicker 2012). As Medicare pays prospectively for hospitalizations and most postacute costs are contingent on an inpatient stay, we can infer that these higher costs are largely driven by physicians' increased propensity to hospitalize patients.

Over 10 percent of our defensive medicine cost estimates were from physician visits, indicating malpractice liability fears are associated with greater referrals and consultations, with approximately the same percentage from extra imaging and other diagnostic tests. Consistent with results reported in Table 4, physician malpractice fears were found to be associated with lower costs for some services, specifically minor and major procedures.

Table 4: Relative Contribution of Physicians in Specialty Categories to Estimate the Cost of Defensive Medicine

Specialty Category	*Number of Physician Specialty/Beneficiary Dyads in Full Sample*	*Contribution to the Per-Beneficiary Estimate of the Cost of Defensive Medicine Under Counterfactual #2 (Somewhat Concerned)**
Primary care specialties	14,061,036	$619.83
Other surgical specialties	8,057,529	435.55
Emergency medicine	4,074,383	298.40
Other cognitive specialties	7,045,411	157.25
Cardiology	6,342,340	112.81
Dermatology	3,713,081	78.47
General surgery	1,977,622	51.18
Ophthalmology	6,673,009	35.38
Psychiatry	653,439	27.71
Obstetrics/gynecology	1,361,858	−39.99
Other procedural specialties	10,905,749	−146.05
Orthopedic surgery	2,881,790	−149.54
TOTAL	67,747,247	$1,481.00

*Calculated by multiplying number of specialty/beneficiary dyads by mean marginal effects by specialty category, and normalizing results to sum to defensive medicine cost estimate. Relative contributions for the estimates of the cost of defensive medicine under the other two counterfactuals were very similar to those reported in this table.
Source: Linked 2008 HSC Health Tracking Physician Survey and Medicare claims dataset.

STUDY LIMITATIONS

Our methodology is complex, rests on multiple assumptions, and is subject to limitations. Of note, we are forced to assume that the malpractice risk beliefs of physicians are independent of one another. If physicians share patients with other physicians who hold similar malpractice concerns and practice patterns as they do or patient preferences for physician treatment styles are correlated with physician malpractice fears, our estimates could be biased upward. That said, we failed to find that physician malpractice fears were correlated within counties, although we cannot discount correlated malpractice fears among physicians treating specific patients. We also had to assume that the effects of malpractice fears on treatment costs are additive across physicians in different specialties treating the patient. If not the case, this could further bias results.

Another assumption is that our malpractice liability fear index is measured without error related to survey instrument design or administration and that, more generally, the index is suitable for the current application. Some defensive behaviors may be incorporated into accepted clinical practice,

and as such may not be captured by our, or any other, approach to estimating defensive medicine costs (Hermer and Brody 2010). The malpractice liability index is constructed from questions that physicians respond to in light of their full patient panel, while our estimates are based on Medicare patients only. We do not know whether physician malpractice liability concerns vary across patients with different payers, although earlier studies suggest that defensive medicine may be higher among patients with traditional Medicare than among patients covered by commercial insurance plans that impose greater utilization controls on physicians (Kessler and McClellan 2002; Avraham, Dafny, and Schanzenbach 2009). (See Appendix SA2 for further discussion.)

The survey excluded physician specialties that generally have limited direct patient interactions: radiologists, anesthesiologists, and pathologists. These specialists mostly perform services prescribed by other physicians, but that is not always the case and these physicians are not immune to malpractice liability and defensive practices. Hence, their omission may bias our estimates downward, especially with respect to imaging costs.

Our study is correlational in nature. While we characterize our results as estimates of defensive medicine costs, our estimates are subject to confounding and we are unable to make causal inferences between malpractice fears and patient costs. For instance, if physician risk aversion is associated with both higher malpractice fears and higher treatment costs, our defensive medicine cost estimates would be biased upward.

The data used in this study are relatively old—from 2008—and changes since then may affect estimates. Such changes include the growth in employment of physicians by hospitals, the spread of new technologies, and the movement away from fee-for-service payment toward alternative payment models that link physician reimbursement to their cost and quality performance. Finally, our research focused on the costs of defensive medicine, but policy makers should also consider the potential effects of defensive medicine on quality of care (Klingman et al. 1996; Frakes and Jena 2014).

DISCUSSION

This study developed a new approach to estimating the costs of defensive medicine and generated estimates for Medicare beneficiaries that fall between those produced by survey- and risk signal-based approaches. These estimates incorporate explicit, albeit normative, counterfactual distributions of

physicians' fears of malpractice claims. The largest estimate, associated with the "no malpractice liability concerns" counterfactual, likely overestimates costs from a social welfare perspective because it ignores benefits from motivating clinicians to avoid errors. We cannot assess the other counterfactuals' appropriateness or, importantly, whether alternatives to current policy can achieve these hypothetical lower distributions of malpractice fears.

Although our new approach to estimating defensive medicine costs has limitations, it represents an important advance over earlier methods insofar as it follows from the underlying psychological process that leads to defensive medicine. It is the subjective fear of malpractice claims that motivates defensive behaviors—fears that may bear little relationship to the actual risks of or financial costs from malpractice claims physicians face.

Defensive medicine is often thought to be mostly associated with greater diagnostic testing. Yet we found that Medicare costs associated with malpractice fears are mostly attributable to higher hospital and postacute care utilization—likely driven by a greater propensity to admit patients to hospitals. The increased use of hospitalists since the early 2000s may have contributed to the greater hospitalization of patients by physicians attempting to avoid malpractice risks, as admitting physicians now less frequently also serve as attending physicians to their hospitalized patients.

Not surprisingly, we found contributions to defensive medicine costs differed considerably across physicians in different specialties. Primary care physicians contributed the most to defensive medicine costs, in part through their clinical decisions, but also by virtue of being seen most often by Medicare beneficiaries.

While we conclude that defensive medicine likely contributes substantially to health care costs among Medicare beneficiaries, it is important to reiterate that these results do not support the positions of those arguing for or against tort reforms, per se. Previous research shows that malpractice liability tort reforms that make filing malpractice claims more difficult or place limits on potential awards have very little association with physicians' malpractice liability fears and subsequently on defensive medicine costs (Glassman et al. 1996; Sloan and Shadle 2009; Carrier et al. 2010, 2013). Moreover, not all defensive medicine is necessarily bad; it can be quality-enhancing (Lakdawalla and Seabury 2009; Frakes and Jena 2014). We found that, in some instances, greater concern about malpractice liability is associated with lower costs, although we cannot assess whether this is a reflection of better quality care, avoidance behaviors, or methodological or data limitations.

An insight from our work is that while fears about the consequences of real or alleged medical errors are associated with greater costs, presumably through defensive medicine, some external motivation to avoid making medical errors by physicians is warranted. This implies there is some nonzero socially optimal level of defensive medicine.

To reduce defensive medicine costs to more appropriate levels, the system for compensating patients' medical injuries should be taken from the current adversarial tort system and replaced by less adversarial, costly, and distressing approaches, such as mediation, disclose and resolve, or administrative determinations that might be more effective than malpractice tort laws in assuaging physician fears of malpractice claims (Kachalia and Mello 2011, 2013). Such systems should recognize that good clinical judgment can at times result in bad patient outcomes, but also should incentivize physicians to improve quality by imposing costs on those with a record of making medical errors, for instance as deemed by independent panels of clinical experts. If successful in reducing physician malpractice fears, these alternative systems could more effectively reduce defensive medicine toward a socially optimal level.

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NOTES

1. Allowed charges were standardized to eliminate add-on payments such as indirect medical education (IME) payments and geographic payment differences.
2. We tested alternative specialty groupings; defensive medicine cost estimates were robust.
3. We explored alternative model specifications and functional forms for robustness. Details are in Appendix SA2.
4. This sample of 977,000 beneficiaries was reweighted using propensity score methods to be similar to the full-weighted sample of 1.84 million beneficiaries.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.
Appendix SA2: In-Depth Methods and Supplemental Results.